

A full-page photograph of a worker in a yellow protective suit and clear hood, wearing red gloves with a radiation symbol, working on a metal structure. The worker is looking down at their work.

H A N F O R D PROGRESS

A PUBLICATION OF THE U.S. DEPARTMENT OF ENERGY FOR ALL HANFORD SITE EMPLOYEES

FEBRUARY 7, 2000



The River.
The Plateau.
The Future.

February 7, 2000

PROGRESS

Cleanup focuses on the river, the plateau, the future

I came to the Hanford Site last May with a mandate from the Secretary of Energy to improve cleanup performance and deliver results that would build credibility



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Klein

and gain support for ongoing work at Hanford. What I found was a site with a considerable amount of talent, commitment, resources and past successes. But it wasn't enough.

What Hanford needed, and what I spent my first six months trying to provide, was a new design that would give "shape" to the cleanup and ensure our ability to deliver on our commitments — and even accelerate the delivery. We needed a common vision, a shared set of values, a clear series of outcomes and a renewed sense of urgency.

We have achieved this new direction by talking with Hanford workers, the community, our regulators and stakeholders. We have boiled down Hanford's hundreds upon hundreds of individual objectives into three widely supported and sharply focused outcomes that have become our rallying cry..."the river, the plateau, and the future!"

We will restore the river corridor. We will transition the central plateau. And we will put Hanford assets to work on future problems of national and global significance.

We will achieve these outcomes through positive collaborations with the community, our regulators, the Hanford Advisory Board, area tribes and regional stakeholders — including our workers. We will strive to do things right the first time, put our considerable resources where they're needed most, and listen harder to our workers and their ideas on how to shorten the process and get better results.

Hanford is gaining both direction and momentum now — taking the groundwork we laid in the last six months and beginning to move forward at an accelerated pace. In the

next year, we will make substantial progress toward cleanup outcomes that include beginning the movement of spent nuclear fuel, quadrupling plutonium stabilization at PFP, shipping transuranic waste off-site to the Waste Isolation Pilot Plant, moving 550,000 tons of contaminated dirt away from the river, and many others.

Achieving these goals will demonstrate both the strength of our vision and our ability to deliver. In so doing, we will be able to increase the community's — even the country's — confidence that we can carry out the cleanup in an exemplary way, deserving of the major cleanup budgets we seek annually.

I'm awed by the possibilities here, and the determination of Hanford employees to make a difference.

Keith Klein, Manager

DOE Richland Operations Office

February 7, 2000

PROGRESS

ORP is getting on with cleanup, showing results

Progress, to me, means “getting on with cleanup.” That’s just what the Office of River Protection has done since it was created last year to take over the

mission of managing Hanford’s tank waste and building the facilities that will ultimately treat the tank waste, changing it to a safe, stable form.

We have met or exceeded our

commitments. We have the team — CH2M HILL Hanford Group, Inc., BNFL Inc. and ORP — in place to get the job done. CH2M HILL Hanford Group, Inc. became the tank farm contractor with its purchase of Lockheed Martin Hanford Corp., and BNFL Inc. is designing the vitrification facilities to glassify the waste.

Getting on with cleanup means showing results. For starters, those results include claiming victory over Tank C-106 by removing 95 percent of its waste and solving the high-heat safety issue.

We have also declared victory over what was once nationally known as Hanford’s “burping tank,” Tank SY-101, by first installing a mechanical arm and most recently transferring about 241,500 gallons of waste.

Our safety record is one we can

celebrate, too, thanks to the dedicated men and women of the River Protection Project.

Where does this progress lead us? It brings us that much closer to protecting the Columbia River, which is the goal of the Office of River Protection and the very reason we exist. Congress created this office to manage the nation’s largest, most complex environmental cleanup project — the storage, retrieval, treatment and disposal of tank waste.

And that’s exactly what we’re working toward. Inside this special Hanford progress report are details of the Office of River Protection’s recent accomplishments.

Dick French, Manager

DOE Office of River Protection



French

Who's Who at Hanford

DOE-RL



Klein

Keith Klein, manager

The U.S. Department of Energy Richland Operations Office manages legacy cleanup, research and other programs at the Hanford Site.

Hanford supplied plutonium for the United States nuclear weapons defense for more than four decades, and is now engaged in the world's largest environmental cleanup project. Three cleanup outcomes are being pursued: restoring the Columbia River corridor, transitioning the central plateau for waste treatment and long-term storage, and putting DOE's assets to work solving regional and global environmental problems.

Prime contractors to DOE-RL:



Hanson

Fluor Hanford

Ron Hanson, president and chief executive officer

Fluor Hanford is the prime contractor for the nuclear legacy cleanup. Fluor's four principal subcontractors are Numatec Hanford, Waste Management Federal Services of Hanford, DynCorp Tri-Cities Services and Protection Technology Hanford. As part of the commitment to the economic development of the Tri-Cities region, Fluor Hanford and its major subcontractors established affiliate companies that are separate businesses with the flexibility to pursue and perform non-Hanford work.

Bechtel Hanford, Inc.

Mike Hughes, president

BHI, the Environmental Restoration contractor, plans, manages, executes and integrates a full range of activities for the cleanup of groundwater, contaminated soils and inactive nuclear facilities. BHI's subcontractors are CH2M HILL Hanford, Inc., and Thermo Hanford, Inc.



Hughes

Hanford Environmental Health Foundation

Sandy Matheson, president

HEHF's Health Risk Management program teams with the site in identifying and analyzing the hazards that Hanford personnel face in the work environment. HEHF's occupational health services provide occupational medicine and nursing, medical surveillance, ergonomics assessment, exercise physiology, case management, psychology and counseling, fitness for duty evaluations, health education, infection control, immediate health care, industrial hygiene, and health, safety, and risk assessment.



Matheson

Pacific Northwest National Laboratory

J. T. Adrian Roberts, interim laboratory director

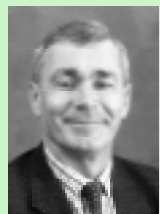
Battelle operates PNNL for DOE's national security and energy missions. The core mission is to deliver environmental science and technology in the service of the nation and humanity. PNNL services include molecular science research, advanced processing technology, biotechnology, global environmental change research and energy technology development.



Roberts

FLUOR HANFORD

(See page 1.)



Hubert

Numatec Hanford Corporation

Xavier Hubert, president

Numatec provides best-in-class engineering and project management services and technical expertise and implements relevant technologies to accelerate cleanup.



Aromi

Waste Management Federal Services of Hanford, Inc.

Ed Aromi, president and general manager

WMH provides management and staff for the Waste Management Project and Analytical Services. The project uses existing and new technology to accelerate treatment and disposal of waste, reduce the need for waste storage and minimize waste through partnerships with waste generators.



Frix

DynCorp Tri-Cities Services, Inc.

Bob Frix, president and general manager

DynCorp Tri-Cities Services provides essential infrastructure services for the Hanford Site, including utilities, facility maintenance, real estate and site planning, emergency response, property management, fleet and transportation operations, and crane and rigging.



Essary

Protection Technology Hanford

Ben Essary, general manager/director

PTH is responsible for management, operation and integration of all safeguards and security services of the Hanford Site, except those of Pacific Northwest National Laboratory. These services include function design, testing and upgrade of safeguards and security systems, material control and accountability, physical security, personnel security, technical security, information security (classified and unclassified), vulnerability assessment and the Hanford Patrol.

DOE-ORP

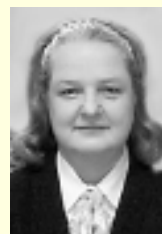


French

Dick French, manager

The Office of River Protection was established in 1998 to manage the Department of Energy's largest, most complex environmental cleanup project — Hanford tank waste retrieval, treatment and disposal. Sixty percent of the nation's high-level radioactive waste is stored at Hanford in aging, deteriorating tanks.

Prime Contractors to DOE-ORP:



DeLozier

CH2M HILL Hanford Group

Fran DeLozier, president and River Protection Project general manager

CH2M HILL Hanford Group, Inc. is the Office of River Protection's prime contractor with responsibility for storing and retrieving for treatment approximately 54 million gallons of highly radioactive and hazardous waste stored in 177 underground tanks. The company's role includes characterizing the waste and delivering it to BNFL Inc.



Lawrence

BNFL Inc.

Mike Lawrence, executive vice president and general manager of the River Protection Project-Waste Treatment Plant

BNFL Inc. was chosen by DOE to design, license, construct and operate a vitrification facility to separate, treat and immobilize radioactive liquid wastes and sludges stored in the underground tanks at Hanford.

Affiliate Companies, previously Enterprise Companies



Fluor Federal Services, Inc.
Bob Heck,
executive vice president and chief operating officer

Heck

FFS provides project management, engineering, procurement and construction services to government clients including the Energy, Defense and State departments, as well as clients at the Hanford Site.



Lockheed Martin Services, Inc.
Bob Russell,
vice president

Russell

LMSI provides telecommunications and network engineering, Internet technology integration, software modernization, maintenance and support, engineering computational resources, data center management, imaging and document management and multimedia services to other Lockheed Martin Corporation companies, government and commercial industry.



Waste Management Technical Services, Inc.
Steve Hamilton,
president

Hamilton

WMTS' role includes privatization of a select group of capabilities that were developed at Hanford. These transportation, engineering, environmental and training services capabilities are unique, state-of-the-art, or simply acknowledged as being among the best available.



COGEMA Engineering Corporation
Bruce Morson,
president

Morson

COGEMA Engineering develops and designs waste sampling characterization and retrieval equipment, specialized analytical methods and techniques. COGEMA Engineering applies its expertise in field screening and sampling to Hanford cleanup, as well as its special welding technique development and application.



Office of River Protection

Hanford underground waste tank facts

- The River Protection Project is the nation's biggest environmental cleanup project.
- Sixty percent of the nation's nuclear waste is stored in aging tanks at the Hanford Site.
- The tank waste is the result of the chemical processing of dissolved uranium fuel rods that had been irradiated in Hanford's reactors to produce plutonium for national defense.
- The tanks contain 54 million gallons of highly radioactive waste and 190 million curies of radioactivity.
- There are 177 underground storage tanks — 149 older single-shell tanks and 28 newer double-shell tanks.
- There are 1,933 capsules containing cesium and strontium tank waste. Combined, the tanks and capsules represent 80 percent of the radioactivity at Hanford.

The Office of River Protection has arrived!

Over the past year, the newly created Office of River Protection has made tremendous progress in tank waste cleanup at the Hanford Site. The Office of River Protection has shown great strides in "becoming the most effective, efficient operation that the government has...the very best at what we do," according to Dick French, Office of River Protection manager.

French's first five initiatives have been accomplished, including identifying the Office of River Protection as an entity separate from DOE-RL, obtaining direct control of the Office of River Protection budget, receiving full contracting authority over CH2M HILL Hanford Group, Inc. (formerly

Lockheed Martin Hanford), maximizing existing funding by streamlining processes and better managing risks, and re-examining staffing functions.

BNFL Inc.'s pilot melter a success

BNFL Inc. recently learned that its low-activity waste pilot melter has documented some impressive initial test results. The pilot melter, designed and operated by GTS Duratek, demonstrated technical proficiency, good melter configuration and glass-production rate, and operational reliability for Hanford's tank waste vitrification project.

The melter successfully met its primary objective by demonstrating that it can reliably produce the required level of glass to meet the contract needs. In fact this one-third-scale pilot melter averaged 5 tons of glass per day, exceeding the design basis of 3.3 tons. This was accomplished while maintaining an average waste processing availability of about 90 percent over a 45-day sustained production run.

Three full-size low-activity waste production melters will be used in the vitrification facilities. Each will be three times the size of the pilot melter, and

Continued on next page



Mike Lawrence, left, BNFL Inc. executive vice president and general manager of the River Protection Project-Waste Treatment Plant, Dick French, manager of the DOE Office of River Protection and Fran DeLozier, president and general manager of CH2M HILL Hanford Group, Inc. confer often on tank waste issues.

- Hanford's tanks are grouped into 18 tank farms, with 86 tanks in the 200 West Area and 91 in 200 East.

- The largest number of tanks in any farm is 18 in TX Farm, and the smallest is two each in AY and AZ Farms.

- The waste tanks are made of reinforced concrete and steel and are completely underground, with monitoring equipment and instrumentation above.

- Hanford's tanks range in capacity from 55,000 to 1 million gallons. The 55,000-gallon tanks are only 15 feet deep, while the million-gallon tanks are 40 feet deep.

- Single-shell tanks were built at Hanford between 1944 and 1964; double-shell tanks were built between 1968 and 1986.

- Hanford's radioactive tank wastes are the oldest in the world; T Farm was the first of its kind.

- Sixty-seven of Hanford's single-shell tanks have leaked or are suspected of having leaked, and have released about a million gallons of waste containing about a million curies of radioactivity.

will average 10 tons of glass per day to meet the current processing baseline.

Single-shell tanks pumped

DOE and its tank-farm contractor continued an aggressive schedule of pumping wastes from the single-shell tanks. Since June 1998, more than half a million gallons of liquid waste have been pumped from single-shell tanks to more environmentally sound double-shell tanks as part of the Interim Stabilization Project.

One of the pumping priorities of the Interim Stabilization Project is U Tank Farm, because its tanks contain complexant chemicals. These chemicals keep radionuclides in solution that would normally be precipitated as a solid — and if a leak occurred, this would allow the waste to travel much quicker through the vadose zone between the surface and the groundwater. The first U Farm tank began pumping in September.

Pumping was completed in 1999 on two tanks in T Farm, and as of Jan. 20, eight single-shell tanks in S, SX and U Farms were in an active pumping mode or were being evaluated to determine if they met the criteria of interim stabilization. Seven more single-shell tanks are scheduled to begin pumping in 2000.

This success in the pumping of single-shell tanks was spurred by a March 1999 agreement between the Department of Energy, the U.S. Environmental Protection Agency and the Washington State Department of Ecology. This agreement established a court-enforceable, environmental-risk-based schedule for pumping liquid nuclear wastes out of 29 single-shell tanks at Hanford. This schedule gives the highest priority to tanks that pose the greatest risks to the environment and human health.

Cross-site line moves waste

Hanford's new double-contained Cross-Site Transfer Line was used for the first time in March 1999 when

150,000 gallons of liquid radioactive waste were moved from Tank SY-102 in the 200 West Area to Tank AP-107 in 200 East. Two subsequent cross-site transfers in September and January moved another 1.1 million gallons.

The new environmentally compliant underground waste transfer system replaces a set of six single-walled lines that were built more than 40 years ago and did not meet current regulatory standards.

The new transfer line is more than six miles long and consists of two stainless-steel pipes, both surrounded by a carbon steel pipe. The transfer system also includes a control station, a vent station and diversion boxes with full leak detection capabilities. All of the new facilities are compliant with required regulatory standards.

Support contracts awarded

On June 28, a \$7.6 million contract was awarded for the design and construction of an electrical substation and power transmission lines to support tank waste treatment and vitrification facilities at Hanford.

The new contract can reach its total value of \$7.6 million if all options for design and construction are awarded. This contract was won by a team headed by the Richland office of Wilson Construction Co. of Portland.

The 62-megawatt electrical station will be among the most powerful in the region, and will supply power to the waste treatment and vitrification facilities via 3.5 miles of 230-kilovolt transmission lines.

On Aug. 4, a \$3.5 million contract was awarded for design and construction of site preparation activities, roads and water utilities to support the planned waste vitrification facilities. The contract was awarded to RCI Environmental, Inc. The contract also includes the design and construction of the non-dangerous and "radioactive dangerous" liquid transfer systems from the waste treatment plant site to the Effluent Treatment Facility.

ORP, WMH run evaporator

The 242-A Evaporator processed more than 1.1 million gallons of high-level radioactive waste, allowing the recovery of critical storage space in Hanford's single-shell waste tanks.

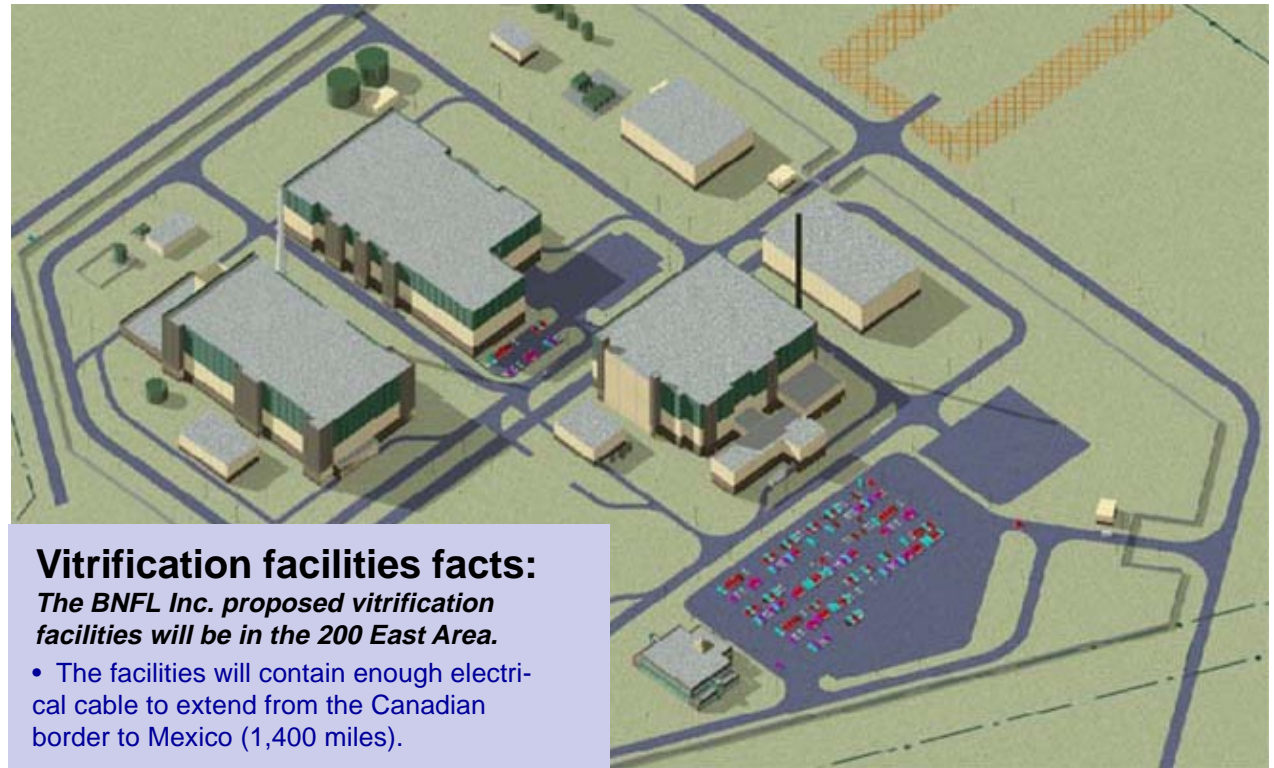
The continued success of this process depends on close coordination between the tank-farm storage and retrieval contractor, CH2M HILL Hanford Group, and Waste Management Federal Services of Hanford, which processes the waste. Before the August transfer, pumps and other equipment were reconfigured or replaced. The waste had to be sampled and characterized. Because it had been nearly a year since the evaporator had last operated, an assessment was done to ensure that the facility operated within DOE and Department of Ecology regulations.

Another evaporator campaign will be conducted soon. The current plan is to operate the evaporator 10 to 15 times during the next five years.

Victory declared on Tank C-106

In September, Tank C-106, long known as Hanford's high-heat tank, was emptied of 188,000 gallons of radioactive liquid and sludge. By Sept. 30, 95 percent of the retrievable waste was transferred from the single-shell Tank C-106 into a double-shell tank. Over the years, the mixture of waste in the tank had generated heat to reach temperatures as high as 235 degrees Fahrenheit, and sometimes raised fears about tank failure. Leakage into groundwater was also a concern as the tank continued to age and deteriorate.

The waste transfer was the Office of River Protection's first completed retrieval of radioactive waste from a single-shell tank at Hanford. Suzanne Dahl of the Washington State Department of Ecology, which regulates and monitors cleanup activities at Hanford, said the Tank C-106 retrieval



Vitrification facilities facts:

The BNFL Inc. proposed vitrification facilities will be in the 200 East Area.

- The facilities will contain enough electrical cable to extend from the Canadian border to Mexico (1,400 miles).
- The piping would reach from Yakima to the Tri-Cities or from Bellingham to Seattle (100 miles).
- The plant will contain enough structural steel to build the Seattle Space Needle three times over (15,000 tons).
- The amount of concrete would fill a football field to a depth of 100 feet (more than 200,000 cubic yards).

operation proves that waste can be removed from the single-shell tanks, and that it also helped provide solutions to some of the technical difficulties surrounding future retrieval operations at other tanks.

At the direction of DOE Headquarters, the high-heat safety issue associated with Tank C-106 was declared "closed" in December and the tank was removed from the so-called Wyden "watchlist" created by a Congressional amendment. The law required identification of Hanford waste storage tanks having the potential for release of high-level waste from uncontrolled increases of temperature or pressure.

In response to the Wyden Amendment, DOE identified and prepared general action plans for four problem areas that could result in releases of high-level wastes: generation of flammable gases; the presence of flammable organic chemicals; the presence of potentially explosive ferrocyanide; and high heat levels generated by certain types of

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wastes. The River Protection Project has made considerable progress toward resolving watchlist safety issues.

Criticality safety issue resolved

In September 1999, the Office of River Protection resolved the Hanford tank farm's nuclear criticality safety issue, which was declared in 1992 because of uncertainty about the amount and distribution of fissile material in the Hanford underground waste storage tanks.

Dr. Carolyn Huntoon, DOE Assistant Secretary for Environmental Management, wrote in a letter to the Office of River Protection, "My staff has carefully reviewed the technical rationale for closing

this safety issue, and we concur with your conclusion that, under current plutonium inventories and operating limits, a nuclear criticality accident is incredible in any of the Hanford site SSTs, DSTs, or DCRTs during waste storage." She was referring to Hanford's single-shell tanks, double-shell tanks, and double-contained receiver tanks.

A letter was sent on Sept. 24 to the Washington State Department of Ecology from the Office of River Protection, stating that the safety issue had been resolved to meet Tri-Party Agreement Milestone M-40-12, "Resolve Nuclear Criticality Safety Issue."

Hanford's 'burping tank' pumped

The Office of River Protection and CH2M HILL Hanford Group are completing a series of waste transfers to address the problems associated with gas buildup in Tank SY-101. About 90,000 gallons of waste were moved to an adjacent tank in the first of three transfers in December, and more than 240,000 gallons were transferred in January. A final transfer is tentatively scheduled in early February.

"This transfer and dilution of the highly concentrated wastes in Tank SY-101 is a prudent action to permanently solve the SY-101 gas buildup problem," said Office of River Protection Manager Dick French. "Our goal is to make SY-101 just another tank in the tank farms."

In conjunction with the transfers, water is being added to the waste to reduce the concentration of gas-generating and -retaining chemicals in Tank SY-101 and the tank receiving the waste.

Before mid-1993, Tank SY-101 periodically released significant quantities of hydrogen gas in sudden eruptions that were commonly called "burps." The installation of a large mixer pump in the tank alleviated this problem by mixing the waste so that small amounts of gas were released continuously, thereby preventing the large gas-release episodes and the fluctuating waste levels.

But in late 1997, DOE and its contractors recognized that the tank's surface level was gradually rising. After determining that gas bubbles and waste particles were becoming trapped in the crust, thus causing the crust to thicken and enlarge, a special project team developed the transfer and dilution plan.

While preparing for the transfer, DOE and its contractors also took actions to manage and mitigate the crust growth. These actions included putting additional controls on operation of the tank, deploying a mechanical arm to disturb the crust and release some of the trapped gas, and lancing the crust with a water spray to soften it before the transfers.

The waste will ultimately become feed material for the planned waste vitrification facility. ♦



River Protection Project personnel loaded plastic sleeving into a riser at Tank SY-101 in May for deployment of a mechanical mitigation arm that released gas trapped within the crust. More than 330,000 gallons of high-level radioactive waste have been pumped from what was once known as Hanford's "burping" tank.

The River Corridor

Restoring the river corridor is one of the outcomes Hanford must focus on to move forward with cleanup — moving the spent nuclear fuel, cleaning up the waste sites, cocooning the remaining production reactors, addressing the contamination plumes and taking down surplus facilities.

SNF Project targeted river risks

The project targeted at removing the highest concentrations of radioactive materials stored near the Columbia River made giant strides in the past year.

The 2,100 metric tons of irradiated uranium metal fuel containing approximately 50 million curies of radioactivity are now in temporary wet storage in the K Basins, and they constitute one of Hanford's most urgent risks. The Spent Nuclear Fuel Project aims to safeguard the river by carefully washing and sorting this fuel underwater, placing it in sturdy new containers, moving it from the basins to a drying facility then placing it in dry, underground storage at a newly constructed facility in the site's central plateau.

This achievement will constitute a major turning point in the overall Hanford Site vision to collect, monitor and safeguard highly radioactive materials away from the river.

Accomplishments in the SNF Project came at an unprecedented pace in 1999 — in construction and hardware, safety performance and documentation, quality and budget controls and regulatory decisions.



DynCorp Tri-Cities Services production manager Rex Oxment, left, discusses features of fuel and scrap baskets with (from left) George Mata, Fluor Hanford Quality Assurance Project manager, Bob Wilkinson, SNF Project director for FH, and Denis DeVine, FH production manager.

K Basins equipment

Major construction activities in the K West Basin culminated last summer when both the Integrated Water Treatment System and the Fuel Retrieval System were installed. According to SNF Project Director Bob Wilkinson, the IWTS and FRS are unique and complicated systems. "Many people don't realize how much new and unique equipment we have had to build, install and test before we can handle the irradiated fuel in the K Basins," Wilkinson said.

The Fuel Retrieval System will pick up, sort and wash the nearly 55,000 fuel assemblies in the K West Basin and place them in steel baskets and overpacks for transport to the new drying facility. It was designed and built specifically for the SNF project, and includes a state-of-the-art computerized robotic system.

Throughout the underwater fuel sorting, cleaning and loading operations, the new IWTS will filter and collect sludge, particulates and soluble contaminants.

New facilities

The SNF Project completed construction on several other crucial components in 1999. The Cold Vacuum Drying facility was completed in October,

and much of its equipment has been installed. This one-of-a kind, 12,000-square-foot structure is DOE's newest nuclear processing facility.

The CVD facility's completion was important. "Everything we need to begin to move fuel out of the K Basins is now in existence," said Phil Loscoe, director of the Office of Spent Nuclear Fuels for DOE's Richland Operations Office.

Last spring, the 220 40-foot steel tubes that will store the dried fuel were installed in a vault below the Canister Storage Building in Hanford's central plateau. The Multi-Canister Overpack Handling Machine, a 450-ton specialized crane, was installed in the CSB.

In 1999, the SNF Project awarded the largest current competitive nuclear fabrication contract in the nation for the manufacture of the 400 huge Multi-Canister Overpacks to hold the fuel. At an on-site shop, fabrication began on the 2,170 large steel and copper baskets that will hold the fuel scrap inside the MCOs.

Quality controls

In June 1999, the DOE Headquarters Office of Project Management concluded an in-depth study of the SNF Project and found progress clearly evident in baseline management and project controls. The project had previously been cited for deficiencies in

these budget-related management areas.

The SNF Project met its first Tri-Party Agreement milestones in 1999. In September, the TPA signatories agreed to bring the K Basins cleanup under the Comprehensive Environmental Response, Compensation and Liability Act, or CERCLA. The decision provided a clear path for the cleanup of sludge, equipment and water after the fuel is removed.

In December, DOE classified the 50 cubic meters of contaminated sludge in the basins as "remote-handled transuranic waste." This allows it to be combined with similar waste, avoiding both the construction of a separate treatment facility and placement of the sludge in underground storage tanks.

"The SNF Project is a closure project," said Fluor Hanford President Ron Hanson. "Our goal is to end the safety risk posed by the spent fuel sitting in the K Basins. We're on track to begin moving spent fuel out of the K West Basin in November 2000. We intend to complete all K East and K West cleanup in just over six years, thus freeing up money for other urgent cleanup needs." ♦



300 Area cleanup **protected** the **river**

For nearly 50 years, the 300 Area just north of Richland was a center for radiological research and fuel fabrication. That activity resulted in highly contaminated facilities and a large inventory of radioactive materials. One of the highest Hanford cleanup priorities is to safely deactivate contaminated buildings and ship radioactive and hazardous wastes out of the 300 Area to approved storage away from the Columbia River.

Activities in the 300 Area in 1999 focused on deactivation of the 324 and 327 Buildings — highly radioactive facilities that contain heavily shielded enclosures (hot cells) once used to examine and test reactor fuel elements and other irradiated materials.

Progress noted

These are some of the 300 Area accomplishments in 1999:

- The 324 Building C Cell, once used to test tank waste retrieval and pre-treatment activities, is now clean and can support other deactivation work. Cleanout of the building's A Cell was also completed.
- Cleanout of the 327 Building F and G Cells was completed two months ahead of schedule.
- Shipment of 14 overpacked capsules containing highly radioactive cesium chloride to the Waste Encapsulation and Storage Facility in the central plateau removed 400,000 curies from the vicinity of the river.
- A total of 236 waste containers — 36 more than the goal — were shipped from the 327 Building to the Central Waste Complex ahead of schedule.



The 300 Area, a few miles from the city of Richland, presents some serious challenges to Hanford cleanup.

- A total of 23 drums of legacy waste buckets were shipped from the 327 Building to the Central Waste Complex.
- Seven cask loads of N Reactor spent fuel were transferred without incident from the 327 Building storage pool to the K Basins, bringing cleanup of the 327 Building another step closer.
- 5,900 pounds of solidified sodium in 16 drums were shipped from the 300 Area to Du Pont in Niagara Falls for recycling, rather than being treated as waste.
- Work necessary for Resource Conservation and Recovery Act closure of the Waste Acid Treatment System, or WATS, was completed on schedule and

\$161,000 under budget. WATS was built in 1975 to collect and process waste acids.

- Cutting on a highly contaminated equipment rack inside the 324 Building B Cell is complete. B Cell, a three-story heavily shielded concrete room used for vitrification experiments, once held 12 such racks.
- A new remote robotic platform is being installed this year to be used for large hot cell deactivation in the 324 Building and other work. Beginning with B Cell, the system will provide access to all spaces within the hot cell areas for decontamination and cleanout, and will help minimize worker exposure. ♦

ER Project made visible progress

Environmental Restoration Project employees, under the management of Bechtel Hanford, Inc., made significant and visible progress this past year toward the goal of restoring the Columbia River corridor of the site.

Employees moved a record volume of contaminated material away from the river, tested technologies to treat waste, constructed new disposal facilities to enable environmental cleanup to continue, reduced the risk from former plutonium production reactors and other nuclear facilities, and consolidated actions that are addressing Hanford's underground contamination.

Soil cleanup work was done simultaneously last year at four separate major locations — a first for the ER Project. Work in the 100H Area, the newest site, began in March, while work continued in the 100B/C, 100D and 300 Areas.

Altogether, employees removed 702,000 tons of contaminated material and disposed of it in the Environmental Restoration Disposal Facility, or ERDF, on Hanford's central plateau. Since the waste began to be transported for disposal, drivers have chalked up 3 million miles without a lost-time accident.

Innovative methods

BHI also began testing technologies to enable the disposal of an estimated 1,500 drums of depleted uranium chips and oil that are buried at the 300 Area soil remediation site. A demonstration of vitrifying (glassifying) the uranium waste was performed in September. Other technologies will be examined this year before a disposal process is selected.

While the digging sites expanded at the H, D and



Contaminated soil is removed from an area near the Columbia River.

300 Areas, the opposite was happening at the ER Project's first remediation site, the B/C Area. Some 700,000 tons of contaminated material has been removed from this site since 1996, and overall cleanup goals were achieved in May. The excavated area is now being backfilled.

The ER Project applied a cost-saving approach to the backfilling by using clean rubble from demolished Hanford buildings.

When the excavated areas are filled, they are revegetated with native grasses and plants that were selected in consultation with the Natural Resource Trustees and the tribal nations.

Expanding ERDF

As trucks filled with contaminated soil and material from areas along the river were steadily depositing their loads in Cells 1 and 2 of the ERDF, other trucks nearby were moving 2 million cubic yards of clean soil away to create two new disposal cells.

The huge new cells, which were finished in November and declared operational by the Environmental Protection Agency in December, assure that waste disposal operations along the river can continue without interruption. The new cells were completed nine weeks ahead of schedule and under budget with no lost-workday injuries. The existing cells are about 95 percent full and the new cells will begin receiving waste in the spring.

Skyline changed

Another dramatic sign of progress in restoring the river corridor took place in August, when two 200-foot-tall exhaust stacks at the D and DR Reactors were explosively dropped to the ground in a matter of seconds (see photo, back cover). This was part of the visible progress being made toward placing the former plutonium production reactors into safe and cost-effective storage. The work, called "interim safe storage," also included removing hazardous material and demolishing adjoining structures. The "footprint" of each of these reactors was reduced by 40 percent.

Additionally, the four-story 108F Biology Laboratory was completely demolished and removed in fiscal 1999. ♦



A water sample is being taken near a groundwater seep along the Columbia River. Information from this monitoring system is used by the GW/VZ Integration Project to better understand the site's groundwater conditions.

Groundwater project gained important knowledge about threats to the river

With the first full year of operations completed, the Department of Energy's Groundwater/Vadose Zone Integration Project has made real progress in developing a site-wide approach to protecting the Columbia River from the threat of underground contamination.

The project, created in late 1997 under the leadership of Bechtel Hanford, is responsible for implementing a plan to protect the river from chemical and radioactive pollutants in the groundwater and in the vadose zone — the soil between the surface and the groundwater.

One of the major accomplishments this year involved the completion of new field work to add to

our understanding of the subsurface. A borehole was drilled to gather information in an area beneath the S and SX Tank Farms in the site's central plateau, where high-level tanks are known to have leaked.

Groundwater samples showed levels of a radioactive contaminant, technetium-99, that was more than 35 times higher than the groundwater regulatory standard. However, no near-term threat to the public or workers is foreseen, because there is no public access to the groundwater beneath the site. Because of the significance of the findings, however, samples from this borehole and others nearby will be monitored closely.

The integration project also made progress in finding better methods to clean up very specific contamination problems. The ER Project operates five pump-and-treat systems which, last year, pumped almost 3 million gallons of contaminated groundwater to the surface, treated it and returned clean water to the aquifer. In addition, the project operated one soil vapor extraction system that removed almost 5,000 pounds of carbon tetrachloride, a known carcinogen, from the groundwater.

In September 1999, the ER Project completed the last step of a two-year study of a new technology called In-Situ Redox Manipulation, designed to reduce the impact of chromium on spawning salmon. It does not require pumping the groundwater to the surface.

The technology, developed at Hanford by the Pacific Northwest National Laboratory, involves injecting a chemical-reducing agent into the aquifer to create a chemically altered treatment zone. When the contaminated groundwater passes naturally through the zone, the toxicity and mobility of the chromium are reduced. Regulators approved full-scale use of the process in October. Installation of the barrier began in February and will be completed in about three years. ♦

The Central Plateau

Transitioning the central plateau for long-term waste management is another part of the Hanford vision. Determining the disposition of the “canyon” facilities, deactivating the Plutonium Finishing Plant and disposing of solid waste are the desired outcomes.

Cleanup of ‘canyon’ facilities moved forward

A challenging environmental cleanup project on the central plateau is determining the disposition of the five large retired production facilities called “canyons.”

One of these canyons, the Plutonium-Uranium Extraction, or PUREX, Facility in Hanford’s 200 East area, was once the backbone of America’s Cold War plutonium production complex. When it was shut down in 1992, PUREX contained plutonium solutions, irradiated fuel, contaminated chemicals and residual plutonium oxides, all of which posed potential risks to workers and the environment.

By pursuing innovative technologies and working closely with the regulators and the Hanford Advisory Board, the Fluor Hanford team was able to deactivate PUREX in 1997, one year

ahead of schedule. This saved \$75 million in shutdown costs and \$33 million a year in maintenance costs for the plant.

B Plant

Lessons learned from this pioneering achievement were then shared with other Department of Energy deactivation projects, such as Hanford’s B Plant, one of the earlier canyon facilities built for recovering plutonium from spent nuclear fuel. In the 1960s, B Plant was modified for a new mission of removing the high heat isotopes — cesium and strontium — from Hanford’s underground waste tanks. The Waste Encapsulation and Storage Facility was added in 1974 to encapsulate and store the cesium and strontium in deep water-filled pools.

Deactivation of B Plant, originally expected to



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Hanford’s huge “canyon” facilities such as the Plutonium Uranium Extraction Facility, or PUREX, are being safely maintained while their fate is being determined.

take seven years, was achieved in September 1998, four years early, saving taxpayers \$100 million and \$20 million a year in maintenance costs.

PUREX and B Plant were transferred to Bechtel Hanford, Inc., the environmental restoration contractor, on Sept. 30, 1999, meeting a TPA commitment. While the final disposition of these facilities is being determined, BHI is maintaining them in a safe condition. To that end, BHI employees have pumped tanks and transported the liquid to treatment facilities, removed asbestos, repaired roofs, completed year 2000 upgrades to essential systems and stabilized contaminated ground around the buildings.

WESF

The Waste Encapsulation and Storage Facility

Continued on next page

(WESF), which stores nearly 2,000 highly radioactive cesium and strontium capsules, was decoupled from B Plant support systems and upgraded to be ready for continued safe long-term operation. During the past year, a major decontamination effort was safely concluded with more than 2 tons of low-level waste and a ton of mixed waste removed from the facility.

More than 500 chemicals that are no longer needed were eliminated from the WESF inventory, 628 kilograms of hazardous products were deployed to beneficial uses and all outdoor contamination areas were eliminated.

Canyons' future

One possible future alternative for the canyons is to use them to store low-level radioactive waste. BHI is helping to determine whether these facilities can safely be used for this purpose as part of its Canyon Disposition Initiative. In fiscal year 1999, BHI continued its assessment work at U Plant, another of the five canyon facilities, where employees deployed high-tech robots to examine the contaminated concrete tunnels for structural integrity and to take radiation measurements and samples. BHI's efforts may ultimately reduce overall Hanford cleanup costs by more than \$1 billion.

Lessons learned from the deactivation of PUREX and B Plant are now being applied across the DOE complex through the National Facility Deactivation Initiative. The Fluor Hanford team has assisted deactivation projects at Brookhaven, Rocky Flats, Oak Ridge and Savannah River. ♦

Plutonium stabilization a **top priority** for Fluor team

According to Bob Heineman, Fluor Hanford's deputy director at the Plutonium Finishing Plant, the PFP team intends to continue to find ways to safely accelerate the stabilization of the large plutonium inventory and to clean out and dismantle the PFP complex to a "clean-slab-on-grade" state.

Until then, the PFP staff is responsible for safely maintaining four metric tons of plutonium in 17.8 metric tons of bulk plutonium-bearing materials left from defense production. The materials are in a variety of forms — metals, oxides, liquids, polycubes (plutonium bound in plastic) and residues — which must be stabilized.

During the past year, the PFP team achieved some important milestones in plutonium stabilization, including startups of the first two stabilization processes.

Thermal stabilization

Thermal stabilization, which began in January 1999 after successful Operations Readiness Reviews, continues. PFP has approximately 5,000 items of plutonium oxide and mixed oxide materi-

als to be thermally treated in small muffle furnaces. Heating drives out moisture and volatile chemicals, converting the materials to a stable oxide powder. During the last fiscal year, 150 items of plutonium oxides and process residues (sludge) were thermally treated at PFP using two existing furnaces.

The rate of stabilization in fiscal year 2000 has been accelerated over last year. Operational experience, along with safety and environmental analyses, determined that the amount of feed material could safely be increased. As a result, processing of plutonium items during the first three months this year has already surpassed last year's total. Three additional muffle furnaces will be operational in February.

Plutonium solutions

Testing of a prototype vertical denitration calciner, which uses heat to convert plutonium nitrate solutions to stable oxide, was restarted in August. Originally, a full-scale calciner was being built to stabilize 4,000 liters of solutions.

Continued on next page



A simpler and different process was subsequently selected and work on the production calciner was halted. The selected process, magnesium hydroxide precipitation, will simplify stabilization, accelerating progress and reducing costs. The new process, which is expected to be operational in July, has been highly successful at other DOE plutonium facilities.

Polycubes, metals

Two-inch cubes called polycubes, used earlier for criticality experiments, were expected to require special pyrolysis equipment for stabilization. After teaming with the Pacific Northwest National Laboratory to conduct extensive testing and analysis, Fluor Hanford determined that, instead of using the new, two-step pyrolysis process, the polycubes can safely be stabilized in existing muffle furnaces.

A significant efficiency will also be realized in stabilizing PFP's inventory of remaining plutonium metal for safe long-term storage. Instead of converting all of the metals to oxide powder in the furnaces, rust-like oxides on the outside of the metal will be brushed off and the stable metals will be placed directly into storage cans. Only the oxides will have to be thermally treated in the furnaces.

Plutonium residues

After the startup of the three additional muffle furnaces in February, PFP intends to restart the residue cementation process, last operated in 1996, to prepare waste material for packaging and shipment to the Waste Isolation Pilot Plant via Hanford's Central Waste Complex. Most of the plutonium residues in PFP's inventory contain insufficient concentrations of plutonium to be considered for 50-year storage and have been declared waste.



A 2-inch polycube of plutonium will be safely stabilized in a muffle furnace.

Saving time, money at PFP

Last April, the Nuclear Material Stabilization Project completed a major revamping of its long-range project plan, referred to as the Integrated Project Management Plan. Developed by "Tiger Teams," the plan used a multi-disciplined cross-section of experts from PFP and across the DOE complex. To determine ways to accelerate the work at PFP, the teams re-evaluated stabilization and deactivation technologies previously planned, including those developed by other plutonium facilities.

Backed by an extensive technical and cost data-

base, the redesigned project plan is expected to save taxpayers \$1.2 billion by accelerating stabilization and deactivation of PFP by 22 years.

On Feb. 1, Westinghouse Safety Management Solutions, a new technical and management team, began work at PFP under a new contract to support the Nuclear Material Stabilization Project. Fluor Hanford's focus was aimed at bringing on board a synergistic contractor management team with relevant experience from other sites that can provide new perspectives and bring innovation to existing processes to further accelerate the work at PFP. ♦

Waste Management Project has **key role** in **accelerating** cleanup

The Waste Management Project plays a key role in the implementation of the strategic plan for the Hanford Site as the final handler of the site's solid and liquid wastes generated by Hanford cleanup.

The Waste Management Project has devoted the last two years to developing the facilities, systems, procedures and pedigree for an integrated system to prepare Hanford's transuranic waste for permanent disposal at the Waste Isolation Pilot Plant, or WIPP, in New Mexico. This year the project is on the verge of initiating the shipment of thousands of drums of transuranic, or TRU, waste for off-site disposal.

"This is a very significant event for the Waste Management Project," said Waste Management Project vice president Ed Aromi. "The upcoming shipment of transuranic waste to WIPP represents the most significant near-term activity for removal and permanent disposal of waste from the Hanford Site and the state of Washington."

During the cleanup, Hanford will have enough TRU waste to fill 80,000 55-gallon drums. Much of it will be x-rayed, examined and repackaged at the Waste Receiving and Processing facility over the next 35 years.



Health physics technician Joe Wiley surveys flanges on the reverse osmosis unit of the 200 Area Effluent Treatment Facility.

Hanford's TRU waste is primarily rags, protective clothing and other debris contaminated with plutonium.

In October 1999, the New Mexico Environment Department issued a Resource Conservation and Recovery Act permit setting new criteria for prepar-

ing waste for disposal at WIPP. Waste Management employees revised 61 Hanford procedures for preparing the TRU waste to comply with the requirements set in the new permit.

Continued on next page

In late January, a team of auditors from WIPP, the New Mexico Environment Department and U.S. Environmental Protection Agency inspected Hanford's waste characterization system and processes to verify that the site can properly prepare waste under the new permit criteria.

Depending on the results of the audit, Aromi said the first TRU shipments from Hanford could take place this spring. "With a successful certification of our TRU program, we will begin the first removal of wastes from Hanford for off-site disposal."

In addition to the upcoming WIPP shipments, the Waste Management team has also spearheaded the retrieval of thousands of drums of Hanford waste that have been stored in trenches in the 200 West Area. Project employees began retrieving, testing and sorting TRU and low-level waste a full 14 months ahead of the TPA schedule.

This schedule advancement was made possible by monetary savings from within the Waste Management Project. This early retrieval was part of a total of \$6.9 million in previously unfunded work accomplished this past year through cost efficiencies.

Waste problem-solver

The Waste Management Project team functions as a problem-solver for other Hanford projects and contractors facing difficult waste issues during their portion of the cleanup of Hanford. The Waste Management Project continues to safely treat, store and dispose of solid and liquid wastes, while providing its specialized support services and expertise.

The project leads the waste minimization and pollution prevention efforts that have helped DOE's Richland Operations Office receive the National Pollution Prevention Award and the President's Closing the Circle Award for Waste Minimization and Pollution Prevention.

Hanford's waste minimization efforts have eliminated or greatly reduced waste streams through installation of treatment systems, equipment upgrades and substitutions, process changes and decontamination site-wide.

The Future

In addition to the start of waste shipments from Hanford to WIPP, the Waste Management Project is also accelerating the treatment of mixed low-level wastes in preparation for final disposal at Hanford.

In a major accomplishment for DOE, the Waste Management Project contracted with a commercial supplier to expand its treatment facility in the Tri-Cities to service the Hanford Site's mixed-waste stream. Instead of spending near-term cleanup dollars on construction of a multi-million-dollar unit, money went directly to more on-site activities. The contractor will be paid on a unit-volume basis, as treatment is accomplished.

Aromi sees a productive future for the project. "We are performing the cleanup work that will extend throughout the duration of the Hanford mission," he said. "As waste is created and retrieved in cleanup at all the various Hanford locations, this project will handle and dispose of all material up to the very last drum. Efficient, safe, quality performance has been and will continue to be a hallmark of the Waste Management Project team." ♦



The Future

Hanford cleanup activities develop assets — people, experience, land, buildings, research and training facilities — that can have a positive affect on our future. They can help solve national and global problems in food production, global warming, pollution and nuclear non-proliferation.

Economic development gathered steam in 1999

If the economic future of Hanford and the Tri-Cities turns out to be as bright as some economists now predict, they may cite 1999 as the turnaround year. The prime contractors and subcontractors at Hanford have been implementing economic development initiatives aimed at weaning the Tri-Cities from dependence on federal cleanup dollars.

These initiatives are being supported with grants, and by freeing up valuable site resources for use by the private sector. It now appears these efforts are beginning to pay off and will provide for a more diverse economic base for the future.

Fluor succeeded

Fluor Hanford refined its economic develop-

ment efforts with the unveiling of its innovative “Target Tri-Cities” initiative. The program’s centerpiece will be a \$4.3 million, 100,000-square-foot industrial building to attract new businesses to the area. Washington Governor Gary Locke wrote in a letter to Fluor Hanford President Ron Hanson, “Your decision [to construct the building] demonstrates how government and private industry can effectively work together to create new business opportunities...”

The various subcontractors at Hanford also helped propel the region’s economy while reducing the site’s inventory and the “mortgages” on obsolete facilities. The site’s infrastructure subcontractor, DynCorp Tri-Cities Services, under the guidance of DOE and Fluor, was able to identify

and redistribute more than \$39 million in excess Hanford Site equipment through federal and state programs. Much of the equipment consisted of excess computers, which were donated to local schools. Additionally, more than \$27 million worth of equipment was sold to private enterprises, and the proceeds were returned to the Hanford budget.

Creating jobs

Bechtel Hanford, Inc., the Environmental Restoration contractor, is also assisting DOE and the Tri-City Industrial Development Council in making excess industrial equipment available to the private sector. This effort is being coordinated through the Tri-Cities Asset Reinvestment Company. BHI has five pieces of equipment that are expected to be the first to be transferred to the firm early this year.

Lockheed Martin Services promoted Hanford area job growth by winning non-Hanford contracts, and has demonstrated leadership, performance, and commitment in helping to achieve local economic development goals. LMSI was awarded several contracts in the multi-million-dollar range with notable clients such as Nike, Gateway Computers, U.S. Gypsum, General Motors, the Portland Teachers Credit Union and the Veterans Health Administration. Recent contract awards from the State of Oregon and the Benton/

Continued on next page

Franklin Private Industry Council have increased the company's involvement in Web development.

Fluor also stepped up job-creation efforts, staying ahead of third-year projections on the way to its ultimate goal of creating 3,000 new jobs by the end of its current contract period in 2001. Job growth by Fluor in its third year exceeded its goal by 40 percent. Also, parent company Fluor Global Services decided to relocate a strategic business division to the Tri-Cities, eventually bringing about 25 jobs with it.

Several site functions were turned over to the private sector in 1999, including calibration services, training and architect-engineering services. All contracts were awarded to area businesses.

Helping entrepreneurs

The Pacific Northwest National Laboratory was again a vibrant part of the Tri-Cities' economic profile, not only excelling in science and technological advancements but also supporting entrepreneurial enterprises. In 1999, PNNL provided technical assistance to 61 businesses and entrepreneurs, with a 90 percent satisfaction rate. Ten businesses were launched or helped to expand, bringing the total of those businesses to more than 50 over the last five years.

PNNL's efforts to make federally funded technology resources available to the private sector also included partnerships with other organizations to operate the Applied Process Engineering Laboratory. APEL is a high-tech incubator facility in Richland which had its first full year of operation in 1999. It achieved a 78 percent occupancy rate with 90 people representing 11 tenant companies.

Livability, tourism

Bechtel Hanford has been a corporate leader for



Local and state officials break ground for an industrial shell building to be used for attracting a new Tri-Cities employer.

several major Tri-Cities community projects that are attracting visitors to the area as well as providing improved amenities for residents. Two completed projects are the conversion of an old swimming lagoon into a Family Fishing Pond and the construction of a 12,000-square-foot playground, both located in Columbia Park. As a result of these civic projects, the Tri-Cities Visitor and Convention Bureau named BHI the "tourism business of the year."

BHI is also conducting studies at B Reactor, Hanford's first production reactor, to determine whether the facility can become a museum and an

additional tourist-attracting historical resource. And the company is evaluating the feasibility of providing a bike trail from Richland to the old Hanford town site. This study is in an early stage and will be developed and reviewed this year.

Federally funded work will continue at Hanford for decades. But the economic base is becoming more diversified, in part because the highly skilled Hanford workforce, the site facilities and the technology capabilities are attractive to other industries.

Continued on next page

The Livingston Rebuild Center, which refurbishes locomotives, is using the former Hanford Railroad maintenance facility in the former 1100 Area. Organizations around the world contract to use the Volpentest HAMMER Training and Education Center and the specialized training programs offered there. And the Fuels and Materials Examination Facility, or FMEF, could even become a motion picture sound stage.

Helping educators

Tank-farm contractor CH2M HILL Hanford Group, Inc., is focusing on promoting job growth through technology-based education at Columbia Basin College and the Washington State University Tri-Cities campus.

Grants to CBC totaling \$120,000 will allow the college to serve more students and create a new associate degree option not currently available at eastern Washington community colleges. A \$200,000 grant to WSU Tri-Cities will enable the college to hire an additional computer science professor.

CH2M HILL also is focusing on supporting entrepreneurs through education, business mentoring and grants to start-up companies through the WSU Business LINKS program. In December, \$75,000 was committed for student internships, a business information center and an advanced business management program. A loaned CH2M HILL employee also is working with WSU to strengthen business partnerships and entrepreneur programs in the area.

These initiatives and the Hanford organizations' commitment to diversifying the economy are helping to make the future look bright for all Tri-Citians. ♦

Research achievements earned PNNL 'outstanding' rating

Pacific Northwest National Laboratory completed another year of accomplishments in fields that can be applied to solving future problems in our country and the world.

For the second year in a row, the laboratory received an "outstanding" rating from the Department of Energy, reflecting the lab's strong performance in science and technology, operational excellence, leadership and community relations.

In 1999, PNNL expanded its capabilities in environmental health research with the creation of the Environmental Health Initiative. The laboratory also formed a partnership with the National Institute for Environmental Health Sciences, which will contribute to better understanding of environmental contaminants.

The laboratory made excellent progress on broadening computational science capabilities and instrumentation essential to understanding complex physical and biological systems. For example, PNNL researchers at DOE's William R. Wiley Environmental and Molecular Sciences Laboratory developed the "electrodynamic ion funnel," a new tool that significantly improves the sensitivity of mass spectrometers.

Environmental science

On another front, PNNL continued strong leadership in DOE's Environmental Management



The vehicle of the future may have a fuel cell using a microchannel fuel processor under the hood. Pacific Northwest National Laboratory has developed a fuel processor for this application.

Science Program. The laboratory received 63 percent of EMSP awards given to national laboratories, and in the four-year history of EMSP, PNNL staff members have led more than 30 projects and received nearly \$40 million in funding.

Continued on next page

PNNL played a key role in resolving Hanford's tank waste safety issues and developing the first science and technology "roadmap" for DOE's Groundwater/Vadose Zone Integration Project. Five PNNL technologies were deployed at the site, including In Situ Redox Manipulation to block chromate plumes from reaching the Columbia River. These were major breakthroughs for Hanford.

Research in global climate-change issues expanded to include a new regional climate-change model for Northwest states that can predict how increasing carbon dioxide levels will affect the region's weather patterns.

Energy research

PNNL aided DOE's energy mission in 1999 with two significant research efforts. The laboratory is developing lightweight materials and emission control technologies to improve the efficiency of the nation's transportation fleet, and also is partnering with the Federal Energy Technology Center to produce advanced fuel cell designs using microtechnology.

Internationally, the lab assisted in transitioning Russian defense laboratories and scientists to peaceful missions through DOE's Nuclear Cities Initiative, which dedicated the first Industrial Development Center in Zheleznogorsk, Russia, this past year.

The lab's staff members have always volunteered their time for the future of the community, but this past year PNNL volunteerism was formalized by the formation of a volunteer organization, Team Battelle. The team launched 36 community projects for the March of Dimes, Junior Achievement, a holiday collection, the Children's Center and a computer support program for seniors.

Another important element of the laboratory's community service is enhancing science and math education. Through the new Scientist-Student-Teacher High School Research Project, students and teachers have the opportunity to improve their science literacy by teaming with PNNL researchers on long-term research projects. ♦

HAMMER continued to 'wow' them!

Fiscal year 1999 was a period of expansion and transition for people, programs and property at the Volpentest HAMMER Training and Education Center. Student-day totals rose 45 percent to 33,605 — up from 23,227 in fiscal 1998.

HAMMER's National Transportation Program (regulatory compliance training) realized a 210 percent attendance increase over the previous year at a significantly reduced cost to program and individual Department of Energy sites. HAMMER's National Counternarcotics Center Program received \$5 million to initiate developmental activities. And the 10,000-acre Patrol Training Academy became HAMMER's Law Enforcement and Security Training Center.

Immersed in growth and change, HAMMER remained clearly focused on its primary goals. The first goal is to provide quality training for the Hanford Site cleanup mission and the DOE complex with hands-on use of realistic props and settings. The second goal is to augment economic diversification by creating a state-of-the-art regional training industry

for students from across the nation and around the world.

Hanford cleanup

The majority of those trained at HAMMER are Hanford workers in hazardous waste operations training, respiratory protection classes, radiation worker training and other site-based courses. Of the 1,695 different classes held at HAMMER last fiscal year, 1,553 were Hanford classes.

Two performance-based exercises staged at the facility — the Plutonium Finishing Plant Mock-up and the River Protection Program H-Farm Simulation — were publicly praised for their effectiveness. With 37 issues addressed in a single simulation, one estimate pegged PFP's return on investment at 1 to 300. In other words, for every dollar spent staging the mock-up, PFP saved \$300 in potential corrective actions.

Regional training

When external customers utilize HAMMER's excess capacity, the facility

Continued on next page

develops its private-sector market while reducing DOE's cost of operating HAMMER. HAMMER's off-site business doubled in FY 1999 in terms of revenues received. Sam Volpentest, executive vice president of the Tri-City Industrial Development Council, continues to provide essential support to program development and operations at HAMMER.

Pacific Northwest fire departments trained regularly at HAMMER during the year. The 184-organization-strong Northwest Public Power Association chose HAMMER as its hands-on training facility. HAMMER moved off-site with courses for the Army Corps of Engineers at John Day and Ice Harbor Dams. And Washington State's Military and Transportation Departments began training at the facility.

Nationally, HAMMER piloted, reviewed, revised and completed 16 Transportation Emergency Preparedness Program training modules. Internationally, foreign border officials continued to train at the facility. The U. S. State Department broke ground for a Port-of-Entry Building and retired jetliner

tie-down area. And HAMMER received visitors from the International Aerial Robotics Competition, the International Atomic Energy Agency and the International Fellows Program.

Promising future

HAMMER begins the year 2000 with a new classroom building, a new room for computer-based training, and plans for several new and exciting life-sized props. HAMMER's partnership with the Occupational Safety and Health Administration to become "OSHA Training Institute West" will bring courses formerly offered only in Des Plaines, Ill., to HAMMER. And the center's partnership with the Multijurisdictional Counterdrug Task Force Training Program to become "MCTFT West" will generate a wealth of acclaimed law-enforcement courses at HAMMER.

For the future of Hanford, the region and the nation, HAMMER just seems to get better and better. ♦

Workers in a HAMMER 40-hour trench rescue class learn proper shoring and stabilization techniques as they attempt to retrieve individuals trapped by a simulated cave-in.



Safety

Safety continues to be the **highest priority**

Hanford continued its outstanding safety performance in 1999, finishing the year with a better safety record than all but two Department of Energy sites.

Increased worker involvement through programs such as the Integrated Environment, Safety, and Health Management System, or ISMS, was one of the keys to Hanford's impressive safety record. Also, the continuing partnership with the Hanford Atomic Metal Trades Council on the Union Safety Representative Program served to strengthen employee commitment to a strong Hanford safety culture.

The overall accident rate for the entire Hanford Site dropped from 2.6 accidents per 200,000 hours worked in 1998 to 2.2 accidents in 1999. The 2.2 rate is well below the comparable figure of 3.0 for all DOE sites.

While improving overall safety statistics, many Hanford contractors and projects also could boast of individual safety achievements. For instance, Bechtel Hanford cut its accident rate dramatically from 4.9 per 200,000 in 1998 to 1.7 in 1999, and the Pacific Northwest National Laboratory

dropped its accident rate from 2.2 to 1.7 cases in the same period.

DOE approved about 3,000 pages of safety documents for all major SNF Project systems except the Canister Storage Building during 1999, and the very large CSB Final Safety Analysis Report was submitted to DOE at the end of January.

In the Office of River Protection, implementation of the Final Safety Analysis Report on Oct. 18 represented a major milestone in the River Protection Project.

Safety 'millionaires'

Fluor Hanford and its subcontractors doing work at the Fast Flux Test Facility, the Plutonium Finishing Plant, the 300 Area, the Spent Nuclear Fuel Project and the Tank Farms each surpassed the milestone of 1 million safe hours worked. Additionally, Fluor administrative workers continued on their streak that began in 1996, passing 4 million safe hours.

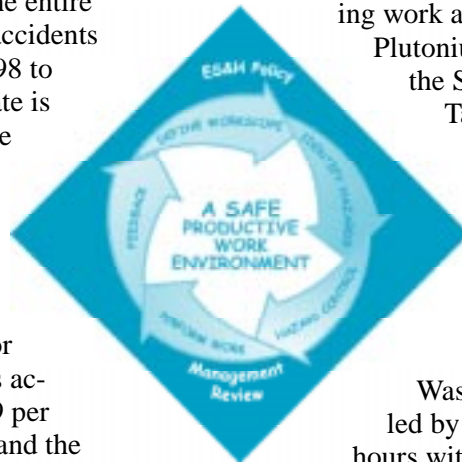
The River Protection Project—Waste Treatment Plant (RPP-WTP) led by BNFL Inc. recorded a million hours without a lost-workday injury, eclipsing the mark over the 1999 holiday period. The

project has grown to more than 650 people since the August 1998 signing of a two-year DOE contract to design the vitrification facilities.

CH2M HILL Hanford Group, the tank-farm contractor for the River Protection Project, passed its second million-hour safety milestone on March 27, 134 days after the last job-related injury that resulted in a lost workday. "This second million hours is a testimony to the diligence and teamwork of the RPP workforce," said CH2M HILL Hanford Group President Fran DeLozier.

Worker involvement

Another notable aspect of the continuing employee-driven safety culture was the strong presence of the employees' stop-work authority. Nowhere was this more evident than in the temporary closing of the Rattlesnake Barricade due to traffic congestion. An employee task force suggested temporarily closing the barricade, then went to work developing a plan to solve the problem. The time the barricade was closed was minimal, and the employees' solution avoided a dangerous situation.



Continued on next page

Other efforts orchestrated solely or primarily by employees were:

- A workshop for radiological practitioners from around the world, focusing on the radiological practice called ALARA, or “As Low As Reasonably Achievable.”
- The fifth annual Hanford Health and Safety Exposition, attended by 14,000 employees and community members.
- A two-day “Safety Summit” sponsored jointly by DOE-RL, Fluor Hanford and the Hanford labor unions.
- The formation of a “Beryllium Awareness Group” designed to offer information for past and present employees on the possible ramifications of working around beryllium in past Hanford operations.

ISMS took hold

The Hanford Site’s most visible and most far-reaching safety overhaul in years is the DOE Headquarters-mandated implementation of ISMS. ISMS is a single system that integrates environmental, safety and health requirements into work planning and execution processes. The system improves efficiency by identifying, analyzing and controlling work hazards and environmental impacts. And it relies on worker involvement and ownership in

the work-planning process.

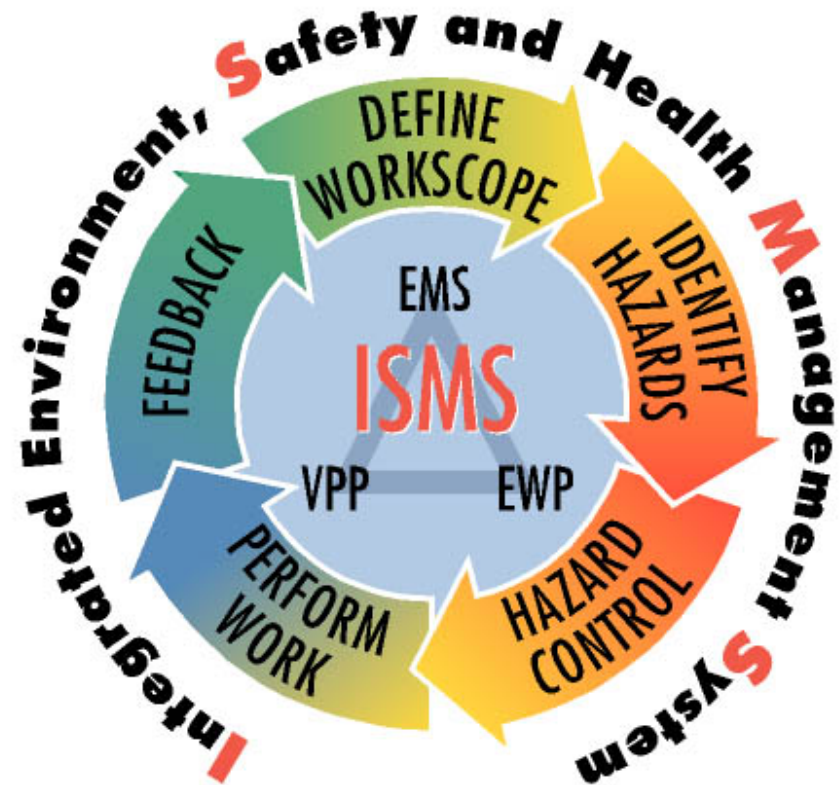
After one or two years of preparation, an organization’s official validation of its ISMS is done by an outside DOE team. The team spends about a week analyzing and auditing the paperwork and practices of the organization. The validation is done in two phases; the first looks at having the necessary procedures in place, and the second determines whether the procedures are in place at the working level.

In 1999, Fluor Hanford and some of its contractors underwent successful verifications of either phase I or phase II. The Fluor team is implementing phase I verification after an extensive preparation period. Meanwhile, Fluor projects in Spent Nuclear Fuel, Tank Farms and Infrastructure all passed the phase II stage, and are now fully validated.

The Pacific Northwest National Laboratory was the first at Hanford to have its ISMS validated, completing the task in 1998. Bechtel Hanford will undergo its validation process in the first half of 2000. The Office of River Protection and the Spent Nuclear Fuel Project were each verified as having an ISMS in place.

The Secretary of Energy has given all sites in the DOE complex until September of this year to have full ISMS implementation. ♦

HANFORD



Protecting the Worker, Public & Environment

U.S. Department of Energy Richland Operations Office

EMS - Environmental Management System
VPP - Voluntary Protection Program
EWP - Enhanced Work Planning

EBR12085.1e

Front cover:

Wearing redesigned personal protective clothing, Hanford worker Bruce Gradisher enters a narrow opening at the Volpentest HAMMER Training and Education Center. The opening is part of a training mock-up of the Plutonium Finishing Plant, which is saving money by providing realistic training in a safe environment.

99110007-3

The Environmental Restoration Project made explosive progress in 1999 with the demolition of twin stacks at D and DR Reactors in the Columbia River corridor.

99070190-6



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